

## NOTES ON THE MOLLUSCA OF THE BERMUDA ISLANDS.

BY C. ABBOTT DAVIS, S. B.

Last July and August were profitably spent in collecting insects and mollusks among the three hundred beautiful islands now called the Bermudas. Like the Hawaiian group, they are chiefly interesting because of their isolated geographical position, being nearly 700 miles distant from any other land. Commerce, however, is rapidly changing the fauna and flora of Bermuda to such an extent that old records, *i. e.*, records of twenty years standing, are obsolete or unreliable. Large quantities of West Indian shells are constantly being brought to the island to sell to the unsophisticated traveller, and some of the stores actually sell these shells as Bermudian. Even the native colored boys are anxious to sell shells for "tuppence," and they are not particular about the historical side, so that one has to beware of all shells not collected *in situ*.

The expeditions of Prof. Helprin in the summer of 1888, and of Prof. Verrill in the spring of 1898 and of 1901, form the nucleus of most of the authentic published data. I had planned a trip to Bermuda for July and August 1903, but upon learning of the Bristol-Mark expedition, I decided to go with them, and the following notes are a part of the records of our trip.

In 1900, Dr. Pilsbry revised the "Air-breathing Mollusks of the Bermudas," and my research differs little except in minor details. For instance, he agrees with Mr. Smith that *Succinea bermudensis* Pfr., is *S. barbadensis* Guild., but states that the animals need a careful study. I agree with the latter statement and as proof of it illustrate three Bermudian forms. Fig. 1 is the common form, Fig. 2 was occasionally taken at Flatts, Fig. 3 is the fossil variety.

*Physa acuta* Drap., has not been recorded since G. Brown Goodes' record of 1888. We took it from rain-water tanks in Devonshire Swamp.

The variety *pulchella* Pfr., of *Truncatella caribæensis* Sowb., is always found *dead*. This, taken with the fact that this mollusk lives at the high-tide mark, and is therefore apt to be water-worn, makes *pulchella* simply a worn *caribæensis*.

In a lot of several hundred *caribæensis* received recently from the West Indies, there is a complete series showing the wear on these

shells, even to fresh transparent specimens. Prof. Verrill has lately added the following to Dr. Pilsbry's list :

*Blauneria heteroclita* Montg., *Hyalina lucida* Drap.

*Pæcilonites zonata* Verr. (Fig. 17), *Siphonaria henica* Verr.

My records add the following :

*Carychium exiguum* Say. (var.). Sub-fossil.

*Vitrea cellaria* Müll. Several at Hamilton.

*Helix pisana* Müll. Several at St. Georges (Fig. 18).

*Planorbis dilatatus* Gld. Dev. Swamps, (Brackish water).

*Paludestrina tenuipes* Cooper (var.). Eve's Pond.

The beautiful genus *Melanpus* needs revision, and as I collected (personally) several quarts of these bewildering shells, I will attempt the following key to the Bermudian forms :

A. Aperture narrow and short, shells small, pointed at both ends, greasy, brownish or blackish, no teeth (see Fig. 4).

*M. bulloides* Mont.

B. Aperture wider and longer, at the extreme base a very prominent fold, shells larger, apex pointed, greasy, color brownish or purplish, with one or more revolving white or yellowish bands, row of teeth within the outer lip very numerous, (Fig. 5).

*M. flavus* Gmel.

1. Color plain brown or purple, no stripes, (Fig. 6).

Var. *purpureus* n. v.

2. Size and shape same as *purpureus*, immaculate white when alive, rare, found only at Hungry Bay, (Fig. 7).

Var. *albus* n. v.

C. Aperture still wider, shell wide at the top, apex abrupt, two or more well developed teeth on the inner lip, often attaining to double the size of *flavus*, not green, (Fig. 8 is the Florida form).

*M. coffeus* Linn.

1. Larger, and apex more pointed than in *coffeus*, the row of teeth in outer lip very irregular and uneven, banded spirally, with brown and white, width of bands very irregular, (Fig. 9).

Var. *gundlachi*, Pfr.

2. Pilsbry says : " Scarcely if at all to be distinguished from the prior *M. gundlachi* Pfr., but not attaining so large a size." These are probably the juvenile *gundlachi*, the lack of color and lustre in the large ones being due to longer exposure and yet they look like another variety so the smaller ones are called (Fig. 10). Var. *redfieldi*, Pfr.

3. Size and shape same, but the revolving bands of light and dark color *alternate evenly*, (Fig. 11).

Var. *alternatus* n. v.

4. Smaller, darker, polished, beautifully mottled with more or less prominent *vertical* stripes, (Fig. 12).

Var. *verticalis* n. v.

5. Stout, *plain brown* form, with no markings whatever. (Fig. 13).

Var. *bishopii* n. v.

Named in honor of mine host Mr. Geo. A. Bishop, Supt. of Public Gardens, Hamilton, Bermuda.

As to *Siphonaria*, Verrill has described in the "Transactions of the Conn. Academy of Science," a species called *S. heuica*. So far as is known, only one specimen—the type—is in existence. This was taken at Bailey Bay on the north shore. We collected over three pints of *S. alternata* Say, and found many of the var. *brunnea* Hanley, also two others.

2. Shell small (size 16 x 13 mm.), blackish, opaque *opalescent*, rare, Hungry Bay, south shore (Fig. 15). Var. *opalescens* n. v.

3. *Intermediate* in size and coloration between *brunnea* and *opalescens*. Very thin, translucent, always distinguished by radial black lines from apex to margin, covering the whole or a part of the inner surface. Common on the south shore at high-tide mark (Fig. 16).

Var. *intermedia* n. v.

There are undoubtedly many marine species which might be added to the published lists of Dall, Heilprin, Verrill, and others; but the great difficulty just now is to eliminate equivalent nomenclature. I have not seen records of the following species taken by us in Bermuda:

<i>Acmæa punctulata</i> Gmel.	<i>Ocenebra intermedia</i> Ads.
<i>Anachis catenata</i> Sowb.	<i>Nassa consensa</i> Rav.
<i>Alabina adamsii</i> Dall.	<i>Natica livida</i> Pfr.
<i>Asaphis deflorata</i> Linn.	<i>Nitidella cribraria</i> Linn.
<i>Bittium varium</i> Pfr.	<i>Olivella rosalina</i> Ducl.
<i>Chione beauri</i> Recl.	<i>Ostrea folium</i> Linn.
<i>Chione pygmxæa</i> Lam.	<i>Pecten ornatus</i> Lam.
<i>Coralliophila abbreviata</i> Lam.	<i>Pitaria fulminata</i> Mke.
<i>Cypræacardia hornbeckiana</i>	<i>Purpura undata</i> Lam.
Möreh.	<i>Rissoina pulchra</i> Ads.
<i>Cythara simulata</i> Rve.	<i>Semela proficua</i> Pult.

*Eulima gracilis* Ads.

*Spirula australis* Lam.

*Gastrochæna ovata* Sby.

*Tellina promera* Dall.

(Fig. 20.)

*Tellina sybaritica* Dall.

*Litiopa bombyx* Kein.

*Vermetus erectus* Dall. This shell is quite common, but generally has the erect portion broken off, as in Fig. 19.

The following are undoubtedly new forms. Cotypes of each are deposited (with the *Melampus* and *Siphonaria*) in the museums at Washington, Philadelphia, Boston and Providence.

*Gastrochæna mowbrayi* sp. n. (Fig. 21).

This has often been mistaken for a juvenile *G. ovata*, (Fig. 20) as it resembles *ovata* in shape and color, but neither in size, nor habitat. In Bermuda *G. ovata* has an alt. of 20 mm. and bores a hole about 10 mm. in diameter in the solid brain-corals, or shell-rock.

On the other hand, *G. mowbrayi* is found in the dead or dying stems of the branch coral (*Oculina*) the entire stem of which could be put into a tube of *ovata*. *G. mowbrayi* occupies a cavity a little larger than the shell (which is about 6 x 3 mm., the cut showing an extremely large specimen) with a small opening to the outer surface of the coral. These shells are often grouped so closely together, as to undermine the strength of the coral, (see Fig. 22). Locality, Harrington Sound, dredged in 20 to 40 ft. Named in honor of Mr. Lewis Mowbray an enthusiastic Bermudian naturalist.

*Tellina lævigata* Linn., var. *stella* n. v.

*T. lævigata* is called the "sunset shell" by the natives, and it well deserves the name on account of its beautiful bands of orange or pink alternating with delicate yellow tints. About one out of twenty of these shells has diverging, radial pink rays (like *T. radiata*). For this nameless variety I propose the name *stella* (Fig. 34) collected at Flatt's Inlet.

*Volvaria avena* Lam., var. *southwicki* n. v.

*Volvaria avena* (Fig. 23) is common along the north shore of Bermuda, and is widely known and easily recognized by its conspicuous transverse orange bands, size 9 x 3 mm.

On Hamilton Beach I found a smaller constant variety (Fig. 24) which had a uniformly dark, mottled ground with no bands of color. Alt. 6 x 2 mm. This variety is named after my friend, Mr. Jas.

M. Southwick, Curator of the Roger Williams' Park Museum, Providence, R. I.

*Key to the Bermudian Species of the Genus Cerithium.*

The species of this genus were the hardest to revise owing to the fact that the descriptions being brief and often inaccurately figured, no two museums have them named alike. A generous use of the microscope is necessary to distinguish species, and while there are undoubtedly intergrades, the majority are I think, distinct species and not varieties. They are so dissimilar that they can be readily separated. Most of the species may be picked up in Bermuda by the thousand. I brought home at least a half bushel for study.

- A. Very small, jet-black inside and out, often decollate, nodules in *vertical rows of three dashes*. Bermuda form, Fig. 25; Haiti form, Fig. 26; white-tipped Florida form, Fig. 27.

*C. minimum* Gmel.

- B. Larger, stouter, plain black or dirty brown inside and out, spirals very uneven, nodules in vertical rows of *three dots* (Fig. 28).

*C. nigrescens* Mke.

- C. Shell stout, spirals uneven, *handsomely variegated* black and white or yellow and white, nodules in vertical rows of three dots (Fig. 29).

*C. variabile* Ads.

Note.—This shell has been called *eriense* Val., and even placed as a variety of *ferrugineum* Say, which it does not resemble in the least. (See the original figure and description of *ferrugineum* by Say.)

- D. Long, narrow, yellowish-brown, spirals very irregular, three vertical nodules united, forming vertical ribs, by far the rarest form in Bermuda (Fig. 30).

*C. ferrugineum* Say.

- E. Long, narrow, apex sharp, black with a white revolving band below the suture, the black band contains dashes and the white band dots, spirals regular, blackish inside (Fig. 31).

*C. septenstriatum* Say.

- F. Larger than any of the above, spirals regular. A whitish calcareous deposit distinguishes this shell (Fig. 32). When this covering is removed by acid or wear as in Fig. 33, it reveals a brownish interior with white bands on which the nodules are shaped like an exclamation point (!), the two upper dots being united. The apex is always very sharp.

*C. albocoopertum* sp. n.

Any other Bermudian records would be gratefully received by the writer, as he has in press a "Check-List of the Bermudian Mollusca."

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GENERAL NOTES.

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MOLLUSCA ON PIKE'S PEAK COLORADO.—Last fall I collected *Pupa muscorum* (L.), *Vallonia cyclophorella* Ancey, *Euconulus fulvus* (Müll.) and *Zonitoides arboreus* (Say) by the printing office on Pike's Peak, 10,000 ft. alt. I put them on record because of the altitude; the dominant vegetation of the place consists of *Achillea*, *Dasiphora*, *Fragaria*, *Saiix*, *Rosa*, *Populus tremuloides*, *Carduus*, *Geranium*, *Epilobium*, *Delphinium*, *Arctostaphylos uva-ursi*, *Campanula*, *Potentilla*, *Allium*, *Pedicularis*, *Gentiana*, *Picea*, *Pinus*, *Juniperus*, *Antennaria*, *Artemisia*, *Pentstemon*, *Machaeranthera*, *Rudbeckia*, *Frasera* and *Calochortus*: nearly all circumpolar genera, it will be observed, the last five only being exclusively American. I have a note that I found also *Succinea avara*, but kept no specimens.—T. D. A. COCKERELL.

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CHIONE CANCELLATA LINN. IN THE JERSEY CITY MARKET.—A strange shell in the market always interests the conchologist. A short time ago my brother gave me a *Chione cancellata* which he had found with some clams (*Venus mercenaria*) purchased of Mr. Brittain, a fish dealer on Bergen ave., Jersey City, N. J. He said there were several in the basket from which the clams were taken. Desirous of knowing whence they came, I inquired of Mr. Brittain where the clams were gathered and he said he believed they came from North Carolina.—SLOMAN ROUS.

THE MOLLUSCAN FAUNA OF ONE LOG.—On October 15th, I collected from the under side of an old log, 12 inches in diameter and 9 feet long, in the vicinity of Des Moines, Iowa, 634 living specimens of the following species:

- Polygyra albolabris* Say, 1.
- Polygyra appressa* Say, 140.
- Zonitoides arboreus* Say, 244.
- Zonitoides minusculus* Binn., 69.
- Conulus fulvus* Müll., 12.
- Succinea avara* Say, 5.